

TENSILE TEXTILE FLOOR COVERING

[Spannbarer textiler Fussbodenbelag]

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The invention concerns a tensile textile floor covering made of polymer fibers, which has been manufactured in the tufting process and consists of a ground fabric and a non-woven fabric, which covers the ground fabric on the walking side, as well as a back coating, which is joined with the ground fabric on the side opposite to the non-woven fabric ("Back side") and thus determines walking comfort.

Textile floor coverings of the kind described above are generally known as "Tufting carpeted floor", where this kind of carpeted floor and non-woven broadloom as well as carpet tiles are sold and laid. In case of tufting carpets, the textile fiber, mostly polyamide, is inserted in the finished ground fabric as per the tufting process (Tufting Technology). The ground fabric ensures dimension stability and the non-woven fabric ensures external view and a partially walking comfort (comp. H. Kirchenberger, TUFTING-TECHNIK, Melliand Textile reports, Heidelberg, 1975). Furthermore, the ground fabrics of the kind described above with non-woven fabric are coated on the back in an already known manner with caoutchouc, styrene-butadiene-latexes or polyurethanes. This coating

is described as back coating or carpet back coating. Generally it is 2 to 8 mm thick and adds to the walking comfort owing to its elastomer characteristics. The back coatings of the type mentioned above are generally foamed and the result is a foamed back. Apart from the walking comfort already mentioned, the foamed back also ensures a wide temperature-proofing and sound-proofing and displays comparatively better life duration.

The disadvantages of the foamed back of the type mentioned above are that severe environmental impact is the result during SB latex manufacturing, where the air impact should also be taken into consideration during latex coating. It has shown that the components of SB latices may be a cause of allergic reactions in certain people, especially children. Moreover, the composition of latices is non-recyclable, thus the used carpets must be discarded immediately. Finally it is also not pleasant that the remains of the latex back, whether bonded or not, remain on the floor, when the old carpet is removed while changing the carpets.

This gives rise to another task to provide a textile bonding material for the floor coverings of the type

already mentioned, where a back coating is available deviating from the technological status, which is recyclable with the textile bonding material, can be disposed off without problems and is free from general allergens but still offers a similar walking comfort as foamed back.

This task is triggered in case of tensile textile floor covering of the type mentioned, which is characterized by the fact that the back coating is a bonding material, which mainly consists of a formed fabric coating and that the formed fabric coating belonging to the back coating is surrounded by a textile bonding and that ground fabric and the back coating are bonded while using a technique which does not hinder the recyclability of the floor covering. Preferably, all the materials are recycling-compatible with each other.

The first objective of the invention is to replace the latex back by a new double-back, which should be bonded with the rough carpet and provides the similar usage characteristics, especially walking comfort as known foamed latex back. Another intention is that the materials are tuned with each other according to the technical point of view in such a way that they can be disintegrated after the use

and can be transformed into another form in a recycling process, for example disintegration, melt-down and renewed extrusion, which uses the raw material for the second usage. It is also possible that the used polymer plastic is depolymerized up to monomer and subsequently polymerized.

The back consists of a non-woven fabric material, which is bonded or meshed with a woven fabric or knitted fabric, whereby the non-woven fabric is strengthened in length or in length and transverse direction, when required, equipped in an electrostatically derivative manner and can accordingly be configured in haptic and optic textile. This bonding material can be used as back coating for textile floor coverings as a substitute for the foamed back or compact foam used till now, without affecting the usage characteristics, especially the walking comfort. Here the wear and tear is reduced through bordering in a textile bonding and the processability is made easy, especially the joining to the ground fabric.

Techniques for bonding with the back, which do not obstruct the recyclability, are for example done by joining with the polymer pastes of the similar polymer type like the usual floor out-walks, increase and

similarly known techniques, where those materials are used, which do not hinder the recycling capability.

In order to achieve sufficient walking comfort

according to the laying situation, it is suggested that the bonded fiber fabric should have a weight of 100 to 400 g/m<sup>2</sup> and a thickness of 0.5 to 10 mm.

In order to equip the bonded fiber fabric in an anti-static manner, it is suggested that it should be mixed with the conductive fibers, which cause a decrease of the surface resistance to a minimum of  $10^3$  Ohm. This bonded fiber fabric results in a diverting floor covering together with a conductive carpet construction (e.g. for computer rooms).

The bonded fiber fabric can basically be manufactured in different manners. Generally, all the recycle-compatible types of polymer fibers and fiber blends can be used. If you, for example, assume a normal manufacturing of spin-fiber non-woven fabric, it is transferred in the process steps - "open - blend - fine open - non-woven fabric building - strengthening" in commercial goods.

Polyolefins (PP, PE) as well as polyamides and polyester are used as raw materials, the same materials, used for manufacturing non-woven fiber material. Accordingly, the pol, the ground fabric, the bonding material for the back and the required glues are manufactured either from a standard raw material (e.g. polypropylene, polyamide, polyester), as well as from the raw material combinations, which can be

made compatible with the help of suitable feed stream and subsequently transformed in a new extrusion form by disintegrating.

Further, a bonded as well as non-bonded web can be used for the previously mentioned textile bonding material. A non-bonded web can be bonded with the help of a Maliwatt stitch-bonding process. It is also possible to process an already bonded web material, e.g. which was bonded with the help of mechanical, chemical or thermal process steps. Known processes in the field of mechanical bonding are meshing (e.g. Mali non-woven fabric process) as well as the air and water shot peening. In the field of chemical bonding: bonding through liquid binders, through foamed binders, paste and powder binders as well as solvent binders. Hot air, contact heat with pressure, infrared heating and a high-frequency field can be for example, used in the area of thermal bonding with the corresponding thermo-plastic fiber material.

Besides the spin-fiber non-woven fabric, as non-woven fabric, the so-called filament non-woven fabric are suited, which are divided by the laid down filaments (endless fibers), so called spun-bondeds, or through laid fibers non-woven fabrics

built according to the melt-blown-principle. Even here the bonding of the non-woven fabrics can take place as per the methods already described.

An especially cost-effective binding of non-woven fabrics can be done in textile made of band material. The band material, which is known in the textile technology and is generally used in many cases, is generally manufactured as per the flat coating extrusion process, where the extruded flat coating is divided in bands according to the breadth.

The non-woven fabric can also be bonded in a textile or knitted fabric made of filament yarn or fiber yarn. Filament yarn refers to a yarn which consists of multiple filament yarns with or without twist, where the filament yarns can also have a textured form. In case of the last one in a texturing process a textile outlook is given to an otherwise very flat filament yarn, where a high undulation is given to the filament yarn. Even here polyolefins as well as polyamides or polyesters can be used as raw material.

Fiber yarns, especially staple fiber yarns, refer to those yarns which are manufactured from fibers of corresponding length, which are manufactured as per the ring-spin or rotor-spin process. Even here

polyolefins (PP, PE), polyamides and polyester are suitable as raw materials.

The back coating, where a non-woven fabric is surrounded in a textile bonding, can be manufactured as per different processes. Examples can be the so-called Maliwatt- process with weft insertion and the needle felt technology.

Both the earlier mentioned processes function with a longitudinal thread system, which provides stability to the flat formation back coating in the longitudinal direction. The longitudinal thread system is made of the already mentioned band material, filament or fiber yarn and is processed with the help of a normal loop forming construction. If desired, a cross thread system can also be brought in both the processes. In the first place, this system is meant to bring stability in the transverse directions for a possible carpet tension at a later stage. Secondly, this cross thread system is used for textile design, especially pattern. Furthermore, this cross thread system can significantly increase the bond to the rough carpet when the cross threads are brought to the lower side of the rough carpet.

Design examples of the invention have been given in the description. The figures of the description show one

textile bonding material for  
each of the three coatings in  
the schematic view, here

floor covering, in two  
designs:

The schematic presentation shows a ground fabric 1, which takes the pol 2 during the tufting process. This pol 2 can be present as closed loop 5 or as sliced nap (pile fabric 4).

In the first version, a non-woven fabric needled with woven textile 7 on the rough carpet with the help of glue 3 (e.g. polymer pastes) is brought in place of the other generally used back coating made of SB latex. The pinned woven textile is meant to provide the required longitudinal and transverse solidity in the first place and a woven textile-like 6 appearance in the second place.

The surface resistance is reduced to  $\leq 10^9$  Ohm by adding conductive fibers 10 during non-woven fabric manufacturing. The combination of a conductive second back and a correspondingly equipped carpet construction results in a derivative floor covering.

Another option for the second back manufacturing is presented by the additional meshing of a non-bonded or pre-bonded non-woven material 6, as given in the figure 2. The hardening through a loop-forming process can take place either as per the malimo principle or as per

the warp knitting principle. Stability is provided in the longitudinal direction by using these processes, where, in addition, a weft yarn 12 can be laid for increase in the transverse solidity and as a design-related component. An additional bonding of conductive yarns or bands 11 causes a reduction of the surface resistance of the textile bonding material to  $\leq 10^3$  Ohm. Even this type of double back, in combination with a corresponding carpet construction, results in a derivative floor covering.

Finally, it should be noted that the materials must be recyclable and recycle-compatible for each other. This means that either they are made of the similar base materials, for example polypropylene, polyamide or polyethylene, or are conditioned by the so-called compatibilizer in such a way that they can be blended with each other. It is also possible to combine a certain quantity of virgin base material with a corresponding smaller quantity of recycling material by the so-called blending (mixing), in order to improve the bonding characteristics.

Besides the design example, there is other textile bonding as well, as they have already been mentioned in the description at the introduction.

#### **Patent claims**

1. Tensile textile floor covering, which is manufactured from polymer fibers in tufting process and consists of a ground fabric (1) and a fiber web (2), which is bonded with the ground fabric (1) and which covers the ground fabric on the entry side, as well as a back coating (6+7), which is connected with the ground fabric on the side lying on the other side of fiber web ("Back side") and which determines the walking comfort, is characterized by the fact that the back coating is a bonding material, which consists of a non-woven fabric coating (6), and that the non-woven fabric coating belonging to the back coating (6+7) is surrounded by a textile bonding, and that ground fabric and back coating are connected with each other under the application of a technology, which does

not hinder the recyclability of the floor covering.

2. Floor covering according to the claim 1 is characterized by the fact that the non-woven fabric coating (6) has a basis weight of 100 to 400 g/m<sup>2</sup> and a thickness of 0.5 to 10 mm in the not collected condition.
3. Floor covering as per the claims 1 or 2 is characterized by the fact that the non-woven fabric coating is made of a loop-formation or a fiber web in the longitudinal or transverse direction.
4. Floor covering as per the claim 1 or 2 or 3 is characterized by the fact that the non-woven fabric coating is meshed with the longitudinal threads (12).
5. Floor covering as per the claim 3 is characterized by the fact that the bordering woven textile is a leno fabric.
6. Floor covering as per claim 3 is characterized by the fact that the loop-formation is a warp knit fabric or stitch knit fabric (7').

7. Floor covering as per claim 3 is characterized by the fact that the non-woven fabric coating (6) is meshed with the help of warp knitting process and/or Maliwatt process.

8. Floor covering as per one of the claims, is characterized by the fact that the non-woven

fabric coating (6) is bonded in a band woven fabric or knit.

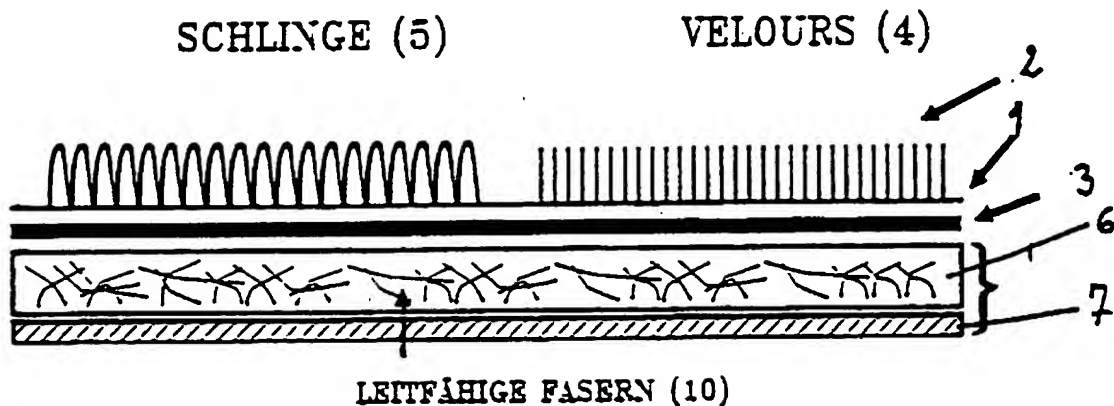
9. Floor covering as per claim 8 is characterized by the fact that the bands are selected for the woven textile or knit from the group of polymer polypropylene, polyethylene, polyamide or polyester.

10. Floor covering as per one of the claims from 1 to 8 is characterized by the fact that the non-woven fabric coating is bonded in one woven textile or knit of filament yarn or fiber yarn.
11. Floor covering as per one of the claims is characterized by the fact that the non-woven fabric coating is chemically hardened before the edging.
12. Floor covering as per one of the claims is characterized by the fact that the non-woven fabric coating is thermally hardened before the edging.
13. Floor covering as per one of the claims is characterized by the fact that the non-woven fabric coating is hardened by the machine, e.g. by using needled felt or mali fibrous web technology.

EP 0 547 533 A1

LOOP PILE (5)

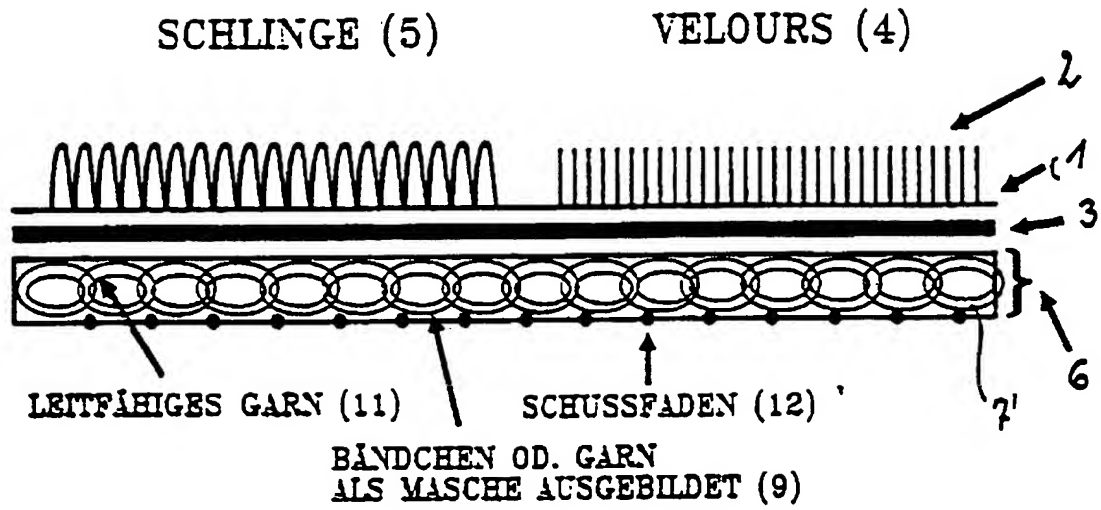
VELOURS (4)



CONDUCTIVE FIBERS (10)

LOOP PILE (5)

VELOURS (4)



CONDUCTIVE YARN (11)

PICK (12)

SMALL BANDS OR YARN (12)  
formed a stitches (9)

European  
Patient

EUROPEAN RESEARCH REPORT

Application No.:  
EP 96 12 1212

RELEVANT DOCUMENTS			
Category	Designation of documents with information (as required) about the corresponding parts	Relates to claim	CLASSIFICATION OF APPLICATION (Int. Cl.5)
A	EP-A-0 349 089 (KONINLIJKE NIJVERDAL-TENCATE N.V.) * Page 2, Row 34 - Page 3, Row 34; Examples *	1-10	D06N7/00 A47G27/02 B32B5/26 D04H13/00 D04B21/14
A	DE-A-2 453 675 (VYZKUMMY USTAV PLETARZSKY) * Page 5, Row 7 - Row 12; Claim 3: Examples *	1-4, 6, 7	
A	US-A-3 834 978 (S.M. NISENSEN ET AL.) * Column 2, Row 46 - Row 72 *	1-3, 13	
A	US-A-4 242 394 (R.J. LEIB ET AL.) * Column 2, Row 1 - Row 4; abstract * * Column 2, Row 26 - Row 68 *	1, 3, 5	
A	CH-A-628 228 (CLAUS KLOCKMANN) * Page 2, right Column, Row 16 - Row 18; Claims 1-3 *	1, 2, 13	RESEARCHED SUBJECT AREA (Int. C 1. 5)

A	<p>CHEMICAL FIBER/TESTILE INDUSRY - MADE FIBER Bd. 41, No. 10, October 1991, FRANKFURT/MAIN, DE Pages 1235 - 1236, XP000233496 A. ADDEOO ET AL. 'Mehrschichtiger PP-Belage fur autoboden' * Page 1236, Abstract 2 - letter Abstract; Diagram 5 *</p> <p>---</p>	1,13	<p>D06N A47G D04H D04B B32B</p>
P,A	<p>EP-A-D 511 469 (HULS AKTIENGESELLSCHAFT) * abstract * * Page 3, Row 35 - Page 4, Row 3; Beispiel *</p> <p>-----</p>	1,2,13	
The said research report has been generated solely for all patent claims			
Place of Research <b>DEN HAAG</b>		Termination date of research <b>02.11.93</b>	Tester <b>PANIES OLLE S.</b>
<p><b>CATEGORY OF THE LISTED DOCUMENTS</b></p> <p>X: Considered solely to be of special importance Y: of special importance in connection with another publication of the same category A: Technological background O: Non-published information P: Intermediate literature</p>		<p>T: The theories or rules at the basis of the invention E: older patent document that has been published on or after the date of application D: Document included in the application L: Document included for other reasons</p> <p>-----</p> <p>&amp;: Member of same patent family, overlapping document</p>	